

# 96 Battling Beaks



**D**uring the history of Earth, species have both evolved and become extinct. Why do some species survive to reproduce while others do not?

**CHALLENGE** → What role does variation play in the process of natural selection?

## MATERIALS



*For each group of four students*

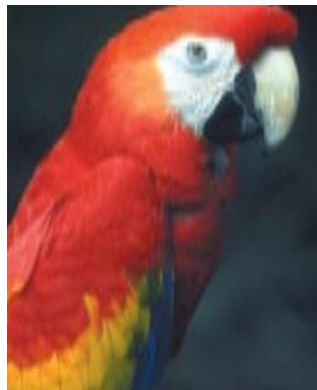
- 4 plastic forks with 1 tine
- 4 plastic forks with 2 tines
- 4 plastic forks with 4 tines
- 4 plastic cups
- 1 number cube
- 1 flat tray or large bin
- 1 cup of “wild loops”



*For each student*

- 1 Student Sheet 96.1, “Forkbird Populations”

*Why do these four different species of birds have such different beaks?*



### ***The Forkbird Model***

In this activity, you will role-play a single species called “forkbirds.” Forkbirds feed by either spearing or scooping their food. During feeding time, each bird gathers “wild loops” and immediately deposits them in its “stomach” before gathering more food. Your goal is to gather enough food to survive and reproduce. This will allow you to pass your genes on to another generation. Occasionally, a forkbird offspring will have a genetic mutation that makes it look different from its parent.

## **PROCEDURE**

1. The initial forkbird population has beaks with only two tines. Each person in your group should begin the activity with a 2-tined fork. Record the initial population of each type of forkbird in Table 1 of Student Sheet 96.1, “Forkbird Populations.”
2. Your teacher will tell you when feeding time begins, and then all of the forkbirds can feed.
3. When feeding time ends, count the number of wild loops eaten by each forkbird. Within your group, the two forkbirds that gathered the most food survive to reproduce. (If there is a tie for second place, then three forkbirds survive. The two forkbirds that tie should keep their forks and skip Step 4.)
4. The two surviving forkbirds should each toss the number cube. Use the table below to determine the type of beak of the offspring of each surviving forkbird. The group members whose forkbirds did not survive should now assume the roles of the offspring.

Number Cube Key	
Your Toss	Forkbird Offspring
1	1-tined forkbird
2	2-tined forkbird
4	4-tined forkbird
3, 5, 6	same as parent forkbird

5. Record the new population of each type of forkbird in your group in the next row on Student Sheet 96.1.
6. Return all of the wild loops to the “forest floor” (tray or bin) to simulate the growth of wild loops.
7. Repeat Steps 2–6 for nine more rounds to represent additional generations.
8. Share your data with the class. As a class, record the population of each type of forkbird over many generations. Be sure to copy the class data onto Student Sheet 96.1.
9. Create a graph of the class totals of each type of forkbird over many generations. You can plot the data for all three types of forkbirds on a single graph. Be sure to title your graph, label your axes, and provide a key.

## ANALYSIS



1. Which type of forkbird was the most successful? Explain how the class data support this conclusion.



2.
  - a. Look at your graph of the class results. Describe what happened to the number of each type of forkbird over many generations.
  - b. In the forkbird model, mutations at reproduction were much more common than they are in real life. Imagine that the number of mutations was lowered, so that the vast majority of offspring had beaks similar to those of their parents. Predict what you think would have happened to the numbers of each type of forkbird in future generations.
3. How did the forkbird activity simulate the process of natural selection? Explain.



4. The forkbirds that you studied are a single species. Although they look slightly different, they are part of a single, interbreeding population. Imagine that a change in the food supply occurred.
  - a. As a result of heavy rains, the major source of forkbird food is now soft berries, like blueberries. After many, many generations, how many types of forkbirds do you think will be in the population? Explain your reasoning.
  - b. As a result of a drought, the major source of forkbird food is now sunflower seeds. After many, many generations, how many types of forkbirds do you think will be in the population? Explain your reasoning.
5. Did this activity model Darwin's or Lamarck's theory of evolution?
6. What are the strengths and weaknesses of this activity as a model for evolution?
7. **Reflection:** The cheetah, an extremely fast and efficient hunter, is an endangered species. The few cheetahs alive today show very little variation. How does this help to explain why cheetahs are on the verge of becoming extinct?